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Carnegie-Mellon University
Software Engineering Institute

A Collaboration in Implementing Team Risk Management

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Loral Defense Systems - Eagan

March 1996

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FOR THE COMMANDER

Thomas R. Miller, Lt Col, USAF
SEI Joint Program Office

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Acknowledgments

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A Collaboration in Implementing Team Risk Management

Abstract This report presents results of a collaborative development effort to transition the Software Engineering Institute (SEI) team risk management process into practice. The collaboration involved a DoD program office (customer), a commercial contractor (supplier), and the SEI in an effort that included development, test, and refinement of the team risk management approach. The focus of the report is on the results of the collaboration between the contractor organization and the SEI.

Chapter 1 Overview of the Report

Collaboration Effort In the second quarter of 1993, the Software Engineering Institute (SEI) entered into a collaborative agreement with a Department of Defense (DoD) client to transition the team risk management process into a software development project — the pilot project.

Objective This report focuses on the details and presents the results of the collaboration with the contractor (supplier) organization.

Pilot Project The transition effort involved a pilot implementation of team risk management within a software-intensive airborne system development program.

Lessons Learned By using the collaborative events conducted between the SEI and the contractor organization as a framework, this report focuses on the lessons learned in the effort to transition team risk management into the pilot program.

Summary of the Report

An overview of the team risk management approach is presented and the process of establishing the foundations for the transition is discussed. The major process steps in the collaboration are then reviewed and the relevant issues, problems, successes, and lessons learned are presented. The paper concludes with a review of the collaboration and a summary of the lessons learned.

Confidential

Because of confidentiality agreements established between the SEI and client organizations, the specific pilot program is not identified in this report.

Bracketed Phrases

Throughout this report, brackets [] are used to identify editorial additions that were employed to improve the clarity of quotes and comments.

Chapter 2 Team Risk Management

Overview of Team Risk Management

Team risk management [Higuera 93], [Dorofee 93], [Higuera 95] enables the customer and supplier to work together cooperatively, continuously managing risks throughout the life cycle of a software-dependent development program. It is built on the principles of risk management and a philosophy of cooperative teams.

Cooperative Working Environment

The team risk management approach establishes a cooperative working environment throughout all levels of a program that gives everyone in the program the ability and motivation to look ahead and to handle risks before they become problems.

Team Risk Management Model

The model for team risk management is shown in Figure 1. Each function has a set of activities backed by processes, methods, and tools that encourage and enhance communication and teamwork.

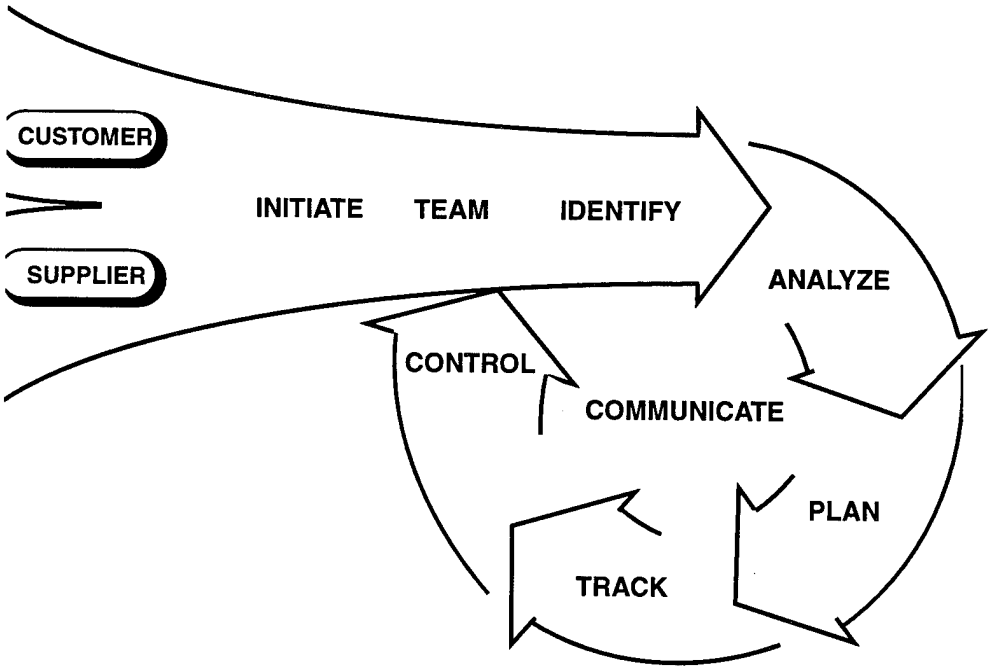
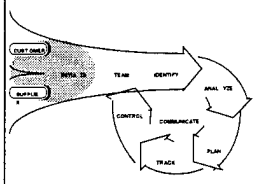
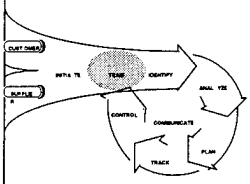
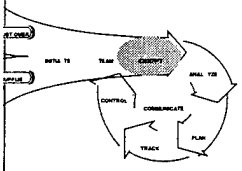
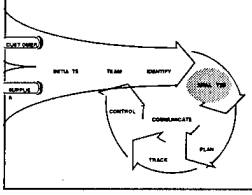


Figure 1: Team Risk Management Model

Management Functions

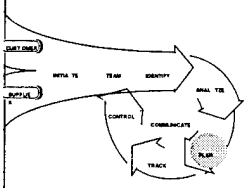
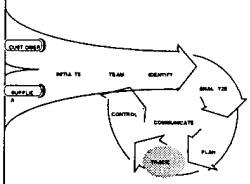
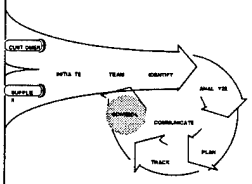
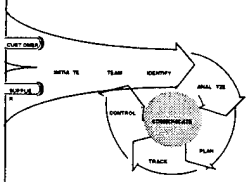
Table 1 summaries each of the team risk management functions. Communication is an integral part of all these activities. More details can be found in the *Continuous Risk Management Guidebook.*[1]

Table 1: Team Risk Management Functions

Function	Description
• Initiate 	Recognize the need and commit to create the team culture. Either customer or supplier may initiate team activity, but both must commit to sustain the teams.
• Team 	Formalize the customer and supplier team, and merge the viewpoints to form a shared product vision. Systematic methods that are applied periodically and jointly establish a shared understanding of the project risks and their relative importance. Establish joint information base of risks, priorities, metrics, and action plans.
• Identify 	Search for and locate risks before they become problems. Identify risks and set program priorities to arrive at a joint understanding of what is important. Identify new risks and changes.
• Analyze 	Process risk data into decision-making information to determine what is important to the project, to set priorities, and to allocate resources. Group risks and quantify impact, probability, and timeframe.

1. *Continuous Risk Management Guidebook.* Dorofee, Audrey; Walker, Julie; Alberts, Christopher; Higuera, Ronald; Murphy, Richard L. & Williams, Ray C. (to be published in June 1996). Pittsburgh, PA. Software Engineering Institute, Carnegie Mellon University.

Table 1: Team Risk Management Functions (Continued)

Function	Description
• Plan 	Translate risk information into decisions and mitigating actions (both present and future), and implement those actions. Joint risks require a team process to develop mitigation plans. Establish the mitigation plans for the risks.
• Track 	Monitor risk indicators and mitigation plans. Indicators and trends provide information to activate plans and contingencies. These are also reviewed periodically to measure progress and identify new risks. Maintain visibility of risks, project priority, and mitigation plans.
• Control 	Correct for deviations from the risk mitigation plans. Actions can lead to corrections in products or processes. Any action may lead to joint resolution. Changes to risks, risks that become problems, or faulty plans require adjustments in plans or actions. Maintain the level of risk acceptable to the project managers.
• Communicate 	Provide information and feedback internal and external to the project on the risk activities, current risks, and emerging risks. Communication occurs formally as well as informally. Establish continuous, open communication. Formal communication about risks and action plans is integrated into existing technical interchange meetings, design reviews, and user requirements meetings.

Chapter 3 Collaboration Description

Overview

The collaborative transition effort spanned more than 18 months. The effort involved personnel from three organizations: the DoD program office (customer), contractor (supplier), and the SEI.[1]

Aspects of the Collaboration

The collaboration addressed three key issues relating to the installation of team risk management:

1. transition of the team risk management approach
2. facilitation of the team risk management processes
3. development and enhancement of the methods.

Transition

The transition of team risk management into routine practice within the contractor organization and the program office was a primary goal.

Facilitation

The SEI was directly involved in the facilitation of the team risk management processes within the pilot program and was an integral part of the transition and development processes.

Development and Enhancement

At the start of the collaboration, the processes and most of the methods and tools of team risk management had been developed, but many aspects of the approach had not been extensively tested. Much of the collaboration addressed extending and customizing the team risk management approach through a cooperative effort between the contractor and the SEI.

1. Throughout this report, the customer and supplier of the team risk management model are the government and contractor, respectively.

Section 1 Collaboration Goals and Background

Goals of the Collaboration

The broad goals of the collaboration were to

1. transition the team risk management process into routine practice within the pilot program
2. lay the foundations for broadening the processes and methods into other programs within both the government and contractor organizations
3. modify, enhance, and expand the team risk management methods to meet specific client needs and to improve the quality and effectiveness of the approach.

Establishing a Working Relationship

The pilot program and the corporate organization were selected based upon the following characteristics:

- positive attitude toward change and improvement
- commitment to software process improvement

Positive Attitude Toward Change and Improvement

In general, the program was characterized by a positive attitude toward improvement and a receptiveness to new approaches. Both the government program office and the contractor had a strong, progressive management team assigned to the program. In fact, risks had been addressed in the initial phases of the program, and the contractor was addressing risk management indirectly as part of problem and issue reporting and tracking.

Commitment to Software Process Improvement

Within the program office and the contractor organization, there was a commitment to and an active involvement in software process improvement.

Section 2 Structure and Roles

Structure of the Collaboration

The collaboration involved personnel from the government, contractor, and the SEI. Personnel from these organization were involved in two distinct sets of activities:

- conducting team risk management processes or
- facilitating team risk management and transition processes

Teams Involved in the Collaboration

Three distinct teams were formed for the collaboration:

- government-contractor team
- government transition team
- contractor transition team

Composition of the Teams

The organizations and personnel that formed the teams for the collaboration are shown in Figure 2.

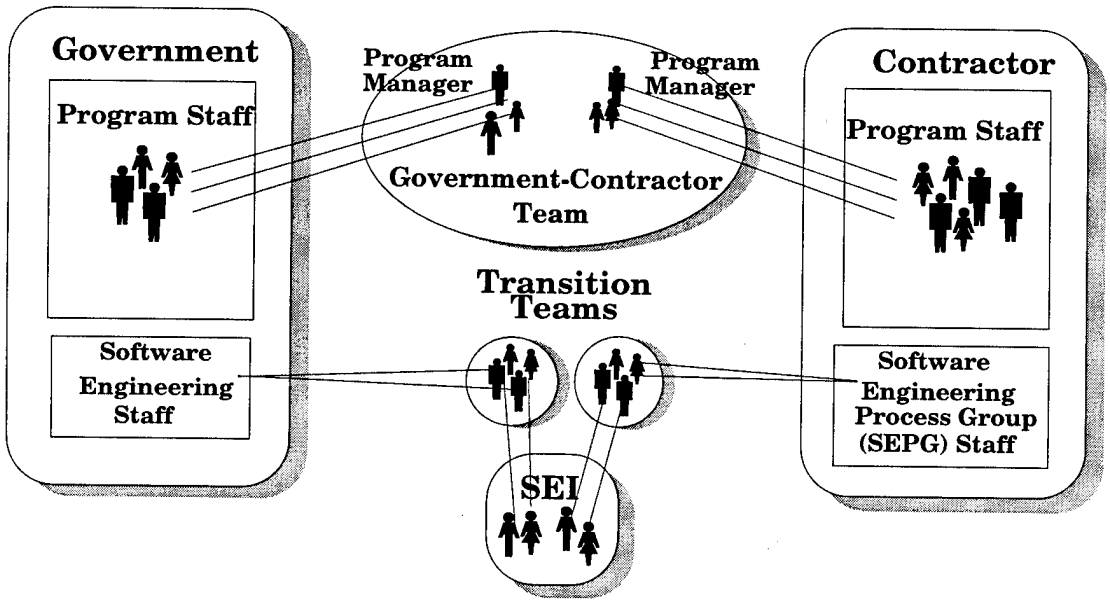


Figure 2: Team Composition Model

Government - Contractor Team

The government-contractor team consisted of two program managers (PM), government and contractor, and at least two key program personnel from each organization. This team met periodically to conduct the joint activities of team risk management, e.g., *team reviews* (refer to Chapter 4, Section 12) and *joint action planning* (refer to Chapter 4, Section 13).

Government Transition Team

Two individuals were assigned to the collaboration from the systems engineering [S/E] staff of the government program offices. These individuals, together with two SEI staff, formed the government transition team.

It was planned that these individuals would participate throughout the collaboration, but due to government organizational changes the composition of this team was not stable. In general, most of the responsibilities of this team were handled by the SEI team members.

Contractor Transition Team

Two individuals from the contractor's software engineering process group (SEPG) organization were assigned to the collaboration. These individuals participated throughout the full duration of the effort, and together with two SEI staff formed the contractor transition team.

SEI Participation

There was a total of four members of the technical staff from the SEI. Two as members of the government transition team and two others as members of the contractor transition team.

Roles

Transition team members from the government and contractor organizations were trained in the team risk management approach, participated in the planning, contributed to the development effort, and facilitated the team risk management processes within their organizations throughout the duration of the collaboration.

Contribution of the Transition Team Members

The role of these key individuals was primarily as transition agents [Fowler 92] for the process, but they also served as codevelopers in the design, development, and evolution of the methods.

Since one of the objectives of the collaboration was to transition the technology into the entire organization, the collaboration efforts also included considerations of organization-wide needs and the issues relating to broad-based institutionalization of the practices. Their insight into unique organizational issues and their knowledge of the organization's processes facilitated the transition.

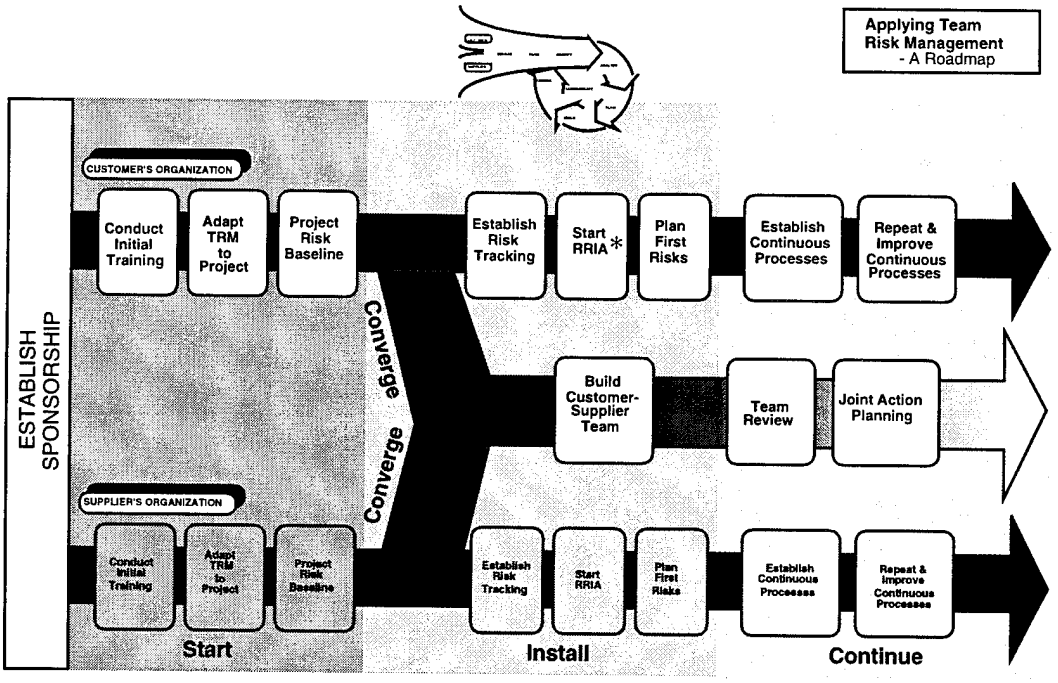
Participation of Other Personnel

Program personnel throughout both organizations participated in the activities of team risk management. This participation involved risk identification, risk management, and support of the risk mitigation activities.

Chapter 4 Implementation

Team Risk Management Roadmap

The efforts reported here were used, in part, in the development of the team risk management implementation process roadmap shown in Figure 3 [Dorofee 95]. The actual implementation of the collaborative effort closely followed the sequence of the roadmap.



* Routine Risk Identification and Analysis

Figure 3: Team Risk Management Roadmap

Process Roadmap

There are three major phases for the implementation of team risk management: *start, install,* and *continue*. These phases and the steps involved within each phase are shown in the roadmap graphic.

Customer and Contractor Timelines

The customer (government) and supplier (contractor) timelines are depicted separately in the roadmap as broad arrows that run from left to right across the roadmap. The implementation begins with the sponsor's commitment to team risk management.

Note: The steps are shown grayed out on the supplier timeline, indicating that these activities are identical to those along the customer timeline.

Joint Activities Timeline

The joint activities timeline, located at the center of the roadmap, parallels the separate customer and supplier timeline. The steps identified on this timeline are the joint team risk management activities conducted by the customer-supplier team.

Events Summary

The major collaboration events, the steps in the roadmap that each supports, and the section of the document discussing the event are shown in Table 2.

Table 2: Major Collaboration Events

Collaboration Event	Description	Section
Meetings to select program for collaboration	A series of meetings among the DoD program office personnel and SEI personnel to discuss expectations and candidate programs for the collaboration	**Section 1: Establish Sponsorship**
Introductory meeting with contractor	A formal meeting that introduced the team risk management approach and the details of the collaboration to contractor personnel. The contractor took advantage of this meeting to include personnel from other groups within the larger organization, those outside the pilot program.	**Section 2: Introductory Presentations**
Training	Formal training of transition team members from the supplier (contractor)	**Section 3: Initial Training**
General presentation	A general presentation of the baseline activities and the continuous team risk management processes for all members of the pilot project who were scheduled to participate in the pilot implementation	**Section 5: Project Risk Baseline**
Interviews -Baseline	The group interviews and meetings that constitute the baseline. These were conducted to identify and analyze the baseline set of risks.	**Section 5: Project Risk Baseline**

Table 2: Major Collaboration Events (Continued)

Collaboration Event	Description	Section
Initial Planning Meeting	A meeting to support the planning of the baseline set of risks. This consisted of discussing, modifying as needed, and finalizing the planning methods and tools for use in the initial phases of the collaboration.	**Section 9: Plan First Risks**
Team Review	Regular meetings held between the government and contractor to review, discuss, and reprioritize program-wide risks. These are key events within the team risk management approach.	**Section 10: Build Government and Contractor Team and First Team Review**
Planning Meeting (contractor)	A formal planning meeting of the contractor personnel conducted by the SEI. This was the first use of the group planning methods on the program and addressed one of the highest priority risks faced by the program.	**Section 11: Joint Action Planning**
Joint Planning Session	A group planning meeting facilitated by the SEI, and involving both the government and contractor personnel. Key risks requiring input and involvement of both partners (government and contractor) to effectively resolve were addressed in these sessions.	**Section 11: Joint Action Planning**
Coordination Meetings	Regular coordination meetings held with the SEI and contractor personnel. These would generally span a full day and involve program technical and management personnel, as well as the members of the transition team from the contractor organization.	**Section 12: Establish Continuous Processes**
Closure session	A final group meeting between the SEI and contractor personnel to formally close the collaboration and to finalize a set of lessons learned and areas for improvement of the collaboration and team risk management processes	**Section 14: Closure of the Collaboration**
Transition Follow-up	A project risk baseline conducted by the contractor transition team personnel on another project, observed by the SEI	**Section 15: Continuation**

Section 1 Establish Sponsorship

Description

Establish Sponsorship is the first step in implementing team risk management, showing that management personnel

- believe the specific risk management program outlined to them is critical to the program
- are willing to commit suitable resources to it
- are committed to its success

Sponsorship and Commitment for the Collaboration

The DoD program office was supporting the SEI Risk Program and was providing the sponsorship for the collaboration. The initial activities of the collaboration involved selecting an appropriate program (customer and supplier) for the collaboration and securing the commitment of all parties to the effort. Based upon discussions and reviews involving the SEI and program office staff, a candidate program was identified and steps were initiated to secure the commitment of key management personnel in both the government and contractor organizations.

Initial Meetings to Secure Commitment

Visits to the government program office and contractor were conducted toward achieving an understanding of the nature, level of personnel required, major process steps, expected outcome of the collaboration, and benefits of a successful adoption of team risk management.

The objective was to achieve the commitment of both the government and the contractor program managers, in addition to other key management personnel.

Program Office Commitment

While management within the government program office was interested in participating, staffing constraints necessitated, at least initially, a very limited involvement; however, there was a definite commitment to actively support the effort. In contrast, the program manager for the contractor was skeptical.

Contractor Program Manager's Qualified Commitment

The contractor's program manager was focused on maintaining progress toward success. His concern regarding the collaboration centered on the possibility that this effort would burden the program with extra work and responsibilities that would add minimal, if not negative, value. He wanted added value that would contribute to the success of the program, not simply more work.

Conditional Approval Received

Commitment was only partially achieved. Approval was given to proceed, with the provision that the government or the contractor's program manager could terminate the process at any time if it was felt that no value added was being realized.

Section 2 Introductory Presentations

Description

The SEI conducted introductory presentations on team risk management for both government and contractor personnel.

Intent of the Presentations

The intent of the presentations was to expose personnel throughout the pilot project and the organization to the team risk management approach.

Content of the Presentations

The presentations addressed all aspects of the team risk management approach and details on the collaboration.

Contractor Presentations

The contractor presentations were conducted at the contractor's facilities and involved key personnel from the pilot program, personnel from other programs, and corporate-wide support personnel.

Government Office Presentations

Presentations were also made to government personnel at government facilities. Personnel from the pilot program and the systems engineering (S/E) staff participated.

Observations

In general, the presentations at both organizations were well received, but a substantial portion of the personnel in attendance expressed some skepticism. Generally, these comments reflected concern over the depth of the commitment of their organization to the effort. For example, would, in fact, the team risk management process be supported over the long haul? Would it be dropped after a short period of time? Is this another false start on improvement that gets nowhere?

Section 3 Initial Training

Initial Training

The initial training activities involved training the contractor's transition team members in the baseline processes and the initial planning steps of team risk management.

Contractor Transition Team Training

The training of the contractor's transition team involved a four-hour session where the details of the baseline activity for identifying risks and the continuous processes were presented.

Roles of the Contractor Team Members

The training centered on the facilitation that the contractor's transition team members would be providing throughout the process and their immediate roles in the baseline activities.

Team Building

The plan was for the same individuals from both organizations to participate throughout the entire collaboration. One of the goals of this initial training was to establish the foundation for the long-term working relationships among the members of the contractor-SEI transition team.

Logistics and Database Issues

While much of the focus of the training dealt with the issues relating to specific processes and methods of team risk management, other aspects such as file formats, software conventions, and information transfer methods were discussed.

Email and Routine Communications

Except for company-sensitive data, the team members decided to use email transfer of documents and information as the routine means of exchanging information among team members. This communication mode greatly facilitated the information management aspects of the remote collaboration.

Section 4 Adapt to the Project

Commitment to Adaptation

A primary consideration in the transition activities was a commitment by the SEI, in cooperation with the contractor's transition team members, to adapt the methods to meet the needs and conventions of the pilot project and the organization.

Continuous and Collaborative Training

While initiated early in the process, training continued throughout the collaboration. The nature of the training became more of a collaborative effort, with the SEI, contractor, and project team members cooperatively establishing detailed practices that best fit the organization and were consistent with the principles of team risk management.

Value of Contractor Participation

The knowledge and experience of the contractor personnel in software process improvement and organizational issues were extremely valuable in defining specific practices.

For example, the spreadsheet data formats were incorporated for routine meeting presentations as a result of a suggestion by the software manager on the project.

Solicitation of Feedback

Throughout the collaboration, the SEI transition team regularly probed project personnel seeking to ascertain their perception of the utility and effectiveness of the methods. It was hoped that through regular feedback from project personnel, and prompt response to that feedback by the transition team, project personnel would develop a greater sense of involvement and ownership of the process. As a result, we hoped that there would develop a stronger commitment to the successful implementation of team risk management.

Section 5 Project Risk Baseline

Initiating Activity

Baseline risk identification and analysis is the first opportunity to introduce a larger number of the project staff to the details of the entire process.

Objectives of the Baseline

The risk baseline activities served three key purposes:

- to continue the buy-in process and to extend the commitment to include personnel at all levels and in all functional groups of the project
- to develop a baseline set of risks within each organization
- to lay the foundation for the ongoing (continuous) process steps

Baseline Activities

The baseline activities were conducted over a three-day period and consisted of [Higuera 93]

- introductory presentation to project participants
- four group interviews
- management risk evaluations
- results briefing

Introductory Presentation to All Project Participants

The introductory presentation consisted of a 45-minute briefing to all of the project personnel who would be participating in the baseline activities. The objectives, specific activities, and general nature of the process were presented. A key element in this presentation was the continuing focus on achieving the buy-in of project personnel. It was hoped that this event would result in at least open-mindedness, if not enthusiasm.

Anxiety and Overcoming the Audit Mentality

One of the more difficult aspects of building commitment to the process in project personnel is overcoming the anxiety that arises from the view that this is another "audit" activity. There was a sarcastic sense evident in informal comments that another organization is "here to help" and make judgments on the project.

Becoming Part of Routine Practices

The introductory presentation apprised project personnel of the fact that team risk management is not an external evaluation process, but rather is a process that will become part of the routine project activities and is inherently nonjudgmental. The external involvement – the SEI presence – is necessary to facilitate the transition into the organization, and the collaboration is intended to create a "risk aware" culture within their organization [SEI 92], [Kirkpatrick 92].

Skepticism Persisted

It was observed that following the introductory presentation, most of the project staff were very skeptical and were awaiting events with uncertainty. This uncertainty was also evident at the start of each of the group interview sessions.

Group Interviews

The group interview [Carr 93] is the primary identification method used during the baseline identification process and involves questions addressed to peer groupings of project personnel (groups of three to five individuals). The atmosphere of the interviews is nonjudgmental, nonattributional, and confidential.

Four group interview sessions were conducted for the baseline.

Initial Anxiety

At the outset of the interviews, a level of uncertainty and skepticism existed regarding the effectiveness and likelihood of success for the endeavor. As each of the interview sessions progressed, especially following the identification and recording of the initial risk for the group, a greater level of involvement was evidenced.

Observations and Lessons Learned

In general, the initial anxiety of project personnel was replaced by a more open and involved participation. This evolution was evidenced in the evaluation comments made by the participants. A representative comment regarding the interview process was that it was a "comfortable setting to express concerns."

Management Evaluation Sessions

As part of the baseline, there are management sessions where the most important risks are identified and prioritized. These risks are selected from among all of the risks identified during the group interviews [Higuera 93], and the *Continuous Risk Management Guidebook*[1]. These sessions are the mechanism to focus on the most important risks quickly and place them in a management-defined priority order.

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1. *Continuous Risk Management Guidebook.* Dorofee, Audrey; Walker, Julie; Alberts, Christopher; Higuera, Ronald; Murphy, Richard; Williams, Ray. (to be published June 1996). Pittsburgh, PA; Software Engineering Institute, Carnegie Mellon University.

Nominal Group and Comparison Risk Ranking

The management evaluations include an implementation of the Nominal Group Technique [Scholtes 88], comparison risk ranking [FitzGerald 90] and consensus-based decision-making processes. These techniques enable management to identify the most important risks to the project and begin to establish a common management understanding of each of the most important project risks. This management comparison risk-ranking activity is fundamentally a consensus-based process which arranges into priority order the most important risks, as identified in the management review session.

Consensus and the Program Manager

While consensus is sought within the management sessions, the consensus-based decision-making processes are defined such that the program manager maintains the authority and the responsibility for the outcome; and ultimately, the results of the process belong to the program manager. The consensus-based processes are effective methods to foster a shared vision, a systems perspective, open communications, and the formulation of proactive strategies among management personnel.

Results Briefing

The final step in the baseline risk assessment is a presentation of the results, without attribution to any group or individual. This results briefing is conducted as a formal presentation to all project personnel who participated in the assessment process. While this step is the conclusion of the baseline risk assessment, this presentation is also the forum to initiate the continuous processes of team risk management.

Enthusiasm

Following the baseline, there was a mix of skepticism and enthusiasm. The baseline seemed to stimulate interest and action; in general there was eagerness to get started.

Section 6 Install

Installation Process

The installation process involved establishing the infrastructure within the project to continuously manage the risks identified in the baseline and to identify newly emerging risks.

Summary of Routine Activities

The basic elements of the installation process are

- establish risk tracking
- start routine risk identification and analysis (RRIA)
- plan first risks

These were addressed by establishing a number of routine activities to manage risks within the project. These activities were the following:

- A risk management board was established and regular meetings were held, approximately monthly.
- Risks were discussed at each weekly project meeting.
- Risks and their status were included as an agenda item at the monthly project meetings

Risk Management Board

The risk management board consisted of the project's software manager, lead systems engineer, and program manager. Occasionally, key technical personnel were included to address specific risks.

Meetings of the board were often conducted just prior to coordination meetings held between the contractor and the SEI.

Weekly Meeting Discussions

The status of risks and mitigation plans were discussed, and, as needed, new risks were presented as part of the regular weekly project meetings held by the project.

Change of Perspective

While the routine activities were initially viewed as "add-on" work, this perception gradually changed and risk management activities were seen as integral to meetings and ongoing project management activities. In fact, as the process matured and the project management staff became more comfortable with and confident in risk management, the risk management board became less a distinct entity, and the risks were routinely managed within the context of the regular project management meetings.

Client Observation

By including risk issues with the weekly meetings, one project staff member observed, "Everyone is involved through the weekly meetings."

Section 7 Establish Risk Tracking

Description

This activity establishes tracking efforts to provide managers with the status of the baseline risks as plans are developed and put into place.

Initial Effort Involved a Spreadsheet

The initial tracking mechanism was established by the software manager and involved a spreadsheet listing each the top N risks identified in the baseline.

Extended Use

Later in the collaboration, the spreadsheet was extended to include joint risks (risks that are jointly shared between the government and contractor) and formed the key instrument for reviews conducted by the risk management board.

Modified and Generated from the Database

As the installation of the team risk management processes progressed, a formal risk database (which included a broad range of risk data, including mitigation strategies and plans) was established for the project.

The spreadsheet and the database were maintained separately but were kept synchronized. The spreadsheet continued to be the key instrument for tracking the most important risks in the project.

Quality Assurance Participation

Initially, the spreadsheet was maintained by the project's software manager while the database was maintained by the contractor's transition team members. Later in the project, the spreadsheet was generated by members of the contractor's transition team; ultimately these responsibilities were transferred to the quality assurance group within the contractor organization.

Gradual Evolution

Throughout the collaboration, there was a gradual evolution of the spreadsheet contents and use. In addition, as part of the tracking and overall risk management process, the quality assurance group began to participate directly in the risk management activities. This involvement included participation in risk reviews and data management support.

Lessons Learned

Having someone assigned to be responsible for reporting progress and status was necessary to "inspire" effort.

Without a due date, it was difficult to get action taken.

Section 8 Start RRIA

Description

Following the project risk baseline, a voluntary method for continuous risk identification and analysis was established to identify and analyze new risks as they emerged in the project.

Communication

The existence of and procedures for the new risk identification process were communicated in a memorandum to all project staff. In this memorandum all project personnel were encouraged to identify new risks and the anonymous character of the process was noted.

Anonymous Submission

The initial method established for new risk identification was an anonymous submission procedure, a drop box located in the organization's library, for risk identification.

Risk Form

New risk submission forms were available at the drop box location and distributed with the memorandum announcing the process.

Ineffective

The voluntary submission process did not work, and no new risks were identified through this process.

Routine Risk Identification

As part of the risk issues agenda item, new risk identification was integrated into the regular weekly project meetings and into the risk management board reviews. For this process the risk spreadsheet was used as a cue for risk identification.

Electronic Submission

There were discussions about implementing the voluntary submission as part of the existing quality assurance problem-reporting system. However, this was never implemented.

Lessons Learned

The initial attempt, which focused on anonymity and voluntary submission, did not work, but enabled project and contractor personnel to participate with the SEI to define methods that worked for the project.

Section 9 Plan First Risks

Initial Planning

The plans and actions for addressing risks were initiated immediately following the baseline activities. Most of the discussions regarding risks were conducted in risk management board meetings and as part of the routine project meetings.

Top N

Most of the initial focus was on the top N baseline risks for the project. Action items and responsibilities were assigned for these. Subsequent planning efforts then centered on the more complex of these risks.

Action Items

Planning initially consisted of the determination and assignment of action items to individuals.

Lessons Learned

It is not enough to take an action. There needs to be a means to ensure that the action was effective.

Action items are insufficient for complex risks; formal action plans and group action planning sessions are required.

Section 10 Build Government and Contractor Team and First Team Review

Team Reviews

After baseline risks were identified and analyzed for both the government and the contractor, the first formal joint event, the team review, was conducted.

Team Review

The team review is a joint meeting of the government and contractor program managers and their immediate staff to discuss and prioritize risks. This session

- brings together each program manager's list of current top risks
- enables a joint review of the status of the key risks and their mitigation plans
- maintains continuity between new risks and the results of the previous team review
- helps assure a common understanding of the most important risks to the program
- assigns responsibilities for the risks
- builds and maintain momentum in government-contractor team risk management

Original Process Modified

Comparison risk ranking (CRR) was originally intended as the method for prioritizing the risks at the team review. At the request of contractor management personnel the multi-voting method was used instead of the CRR. The concern was that the CRR would involve "too much" time (see *Continuous Risk Management Guidebook*[1]).

Format of the Reviews

The initial team review was a face-to-face meeting of all parties; later, most of the team reviews were conducted as teleconferences, involving three separate geographical locations.

Initially, team reviews were facilitated by the SEI; later reviews were facilitated by members of both the contractor and government transition teams.

A Reservation

The contractor expressed a reservation about the initial series of team reviews: "early reluctance with [the] team to put everything on the table."

Positive Response

The first team review was well received as evident in the evaluation comments:

- fostered a team rationale and relationship
- outstanding team-building
- better understanding of the other side
- [customer] was included in sessions and knew when things were coming

Lesson Learned

While a certain amount of "finger pointing" occurred at one point, when it became obvious that the contractor could assign risks to the government, more confidence in the process was evidenced. The building of trust and confidence was a gradual process.

Conclusions

The first few team reviews should be face-to-face to establish trust and build a team (cooperative atmosphere). After these initial events, teleconferencing or other remote communication methods can provide an effective and more cost-effective mode of interaction.

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1. *Continuous Risk Management Guidebook.* Dorofee, Audrey; Walker, Julie; Alberts, Christopher; Higuera, Ronald; Murphy, Richard; Williams, Ray. (to be published June 1996). Pittsburgh, PA; Software Engineering Institute, Carnegie Mellon University.

Section 11 Joint Action Planning

Joint Action Planning

Joint action planning sessions are meetings held between the customer and supplier to generate plans for specific joint risks.

Joint Participation

Key management and appropriate technical personnel from both the government and contractor participated in these sessions.

Format of the Session

The process steps for a joint planning session are the following:

- Preselect a risk(s) for the session.
- Use cause-and-effect diagramming to identify and prioritize root causes.
- Identify the criteria for use in comparing strategies.
- Use brainstorming to generate alternative strategies to address root causes, and apply list reduction methods to identify the "vital few."
- Generate the basis for a task plan (actions and success criteria), preliminary schedule, and resources and reporting mechanisms.

Lessons Learned

One of the important lessons learned was that while routine team reviews could be conducted using teleconferencing technologies, joint action planning needs to be face to face. (Perhaps videoconferencing technologies will enable these to be held remotely?)

Although good facilitation was required, extensive explanation of the process before beginning the session was not required.

A formal task plan was not necessary. Minutes of the session and an action item list with assignments and due dates was sufficient to monitor progress.

Section 12 Establish Continuous Processes

Continuous Processes

The team risk management processes of identification, analysis, action planning, tracking, and control are continuous processes.

Developmental Planning Process

The details of the action planning process were not finalized and were being developed as part of the collaboration. These initial efforts provided a basis for developing key principles for action planning.

Planning Session

A group planning session was held to generate a plan for one of the more pressing risks faced by the contractor. The planning session involved the project software manager and two key technical personnel.

Facilitated by the SEI

The planning session was facilitated by the transition team, with SEI personnel providing the leadership in the process. The basic methods employed included brainstorming, cause-and-effect analysis, and consensus-building and voting activities. The basic process followed that of the joint action planning event (refer to Chapter 4, Section 13).

Lessons Learned

Feedback and comments were solicited on the effectiveness of the planning session. There was a feeling that it was a "meaningful exercise" that drew on requisite expertise to help with the process. Specific lessons learned are summarized below:

- The cause-and-effect diagram used during the analysis process served primarily as a mechanism for achieving a common understanding.
- The criteria for evaluating the risk mitigation strategy, while established early and used to constrain the strategy generation, evolved during the process.
- Because of the time and resources involved, it was felt that group planning sessions would be effective primarily for the more difficult risks, rather than for all of the risks being managed.

Coordination Meetings

To facilitate the installation and support the continuous execution of these processes, regular coordination meetings were held at the client's facilities.

These meetings enabled regular exchanges between SEI team risk management personnel, the contractor's program management staff, and the contractor's transition agents.

Components of Coordination Meetings

The coordination meetings extended between a half to a full day and involved three distinct components summarized below:

- working sessions of the transition team
- working session with project personnel
- meeting with the program manager

First Coordination Meeting

The first coordination meeting was held at the client's facility within two weeks of the completion of the baseline. Subsequent meetings were held approximately monthly thereafter.

Working Session of the Transition Team

Two working sessions of the transition team were held, one as the first meeting in the morning and one as the final meeting before departure.

These sessions address issues relating to transition, effectiveness of the methods, introduction of changes or enhancements, risk database management, and general organizational as well as program-specific issues.

Working Session with Project

A working session with project personnel participating in risk activities was held as the second meeting of the day.

In this session, we discussed and reviewed the risks, plans implemented, actions, and the status of the risks and associated mitigation plans. Issues relating to the effectiveness of the processes, recommendations for improvements, and issues relating to the transition of the processes into the organization were addressed. This meeting was the forum for face-to-face communication, affecting change, stimulating continued activity on program risks, and making decisions on actions.

Meeting with the Program Manager

In this meeting, the program manager is apprised of the results of the day's activities and the status of the transition process, and his/her input is solicited on the team risk management process as well as the transition effort.

Effect of Coordination Meetings

Generally, the coordination meetings proved to be an important stimulus to the program's risk management efforts and enabled the timely addressing of issues that emerged. In addition, these regular meetings facilitated the team-building process between SEI personnel, program management, and transition agents.

For example, the initial approach for the routine risk identification and analysis was not effective in identifying new risks. This issue was addressed at a coordination meeting, and an alternative method was devised and successfully implemented.

Critical Feedback

A major element of the coordination meetings was the dialogue that occurred between project personnel and the transition team members, and among the contractor and SEI transition team members. The results of these dialogues formed the basis for modifications to original approaches. Generally these modifications addressed specific program and contractor requirements and were aimed at improving overall effectiveness.

Section 13 Repeat and Improve

Ongoing Process

Improvement and continuation of the processes were facilitated by the coordination meetings. These meetings provided encouragement and stimulus to the project and provided the forum for project members to comment on and initiate changes in the processes. This was viewed as important, especially as the project evolved.

Tele-Conferences

After the first team review was completed, risks were included as part of the discussions at weekly teleconference calls conducted between the contractor and government.

Observations on Commitment and Improvement

The success of this collaboration relied heavily on the commitment and leadership of strong supporters in key positions in the project. At about nine months into the collaboration, a key supporter (the software manager) left the project. Fortunately, the individual who assumed the position of software manager on the project also believed in the value of risk management. His continuing support was important in ensuring that the processes were sustained and that improvements were made to meet the changing needs of the evolving project.

Broad Commitment

In addition to the personal level of commitment, the commitment of the larger organization, in the form of the contractor's transition team members, is important. These individuals were assigned the responsibility and accountability to ensure that risk management was effective within the project and in transition into the larger organization.

Database Improvements

Throughout the collaboration, a number of improvements were made to the database and templates (e.g., risk information sheets) that were used. Most of these were suggested by project personnel in order to provide additional information or clarify the presentation. For example, the spreadsheet format was modified to include the type of risk and joint risk identification number.

Encouraged Innovation

A key aspect of the collaboration approach was to encourage the contractor organization to modify the templates to meet their needs.

Closure

Early on, there was interest in establishing explicit closure processes for the risks. There was a desire to show progress on the risks.

Lessons Learned on Closure of Risks

The desire to show progress resulted in premature closures of risks. In some cases, actions were completed on a risk and the risk was closed, only to re-emerge a few weeks later. As the more formal planning, tracking, and control processes were established, the closure of the top risks became a joint decision between both the government and contractor program managers.

"Hold Risk" Lesson Learned

The risks that were neither part of the top N nor included in the joint list with the government were identified as "hold risks." A process was defined to regularly review this list, as a cue for new risk identification or to note whether conditions had changed, perhaps making a risk in this category more important to the program. This review was to be conducted by the risk management board.

Despite SEI encouragement, the encouragement of the contractor transition team members, and the general agreement among project personnel that the hold-risk review approach could provide an effective method for risk identification, the method was never formally adopted, although one member of the risk management board occasionally and informally reviewed these risks. As a result of not reviewing the hold risks more formally, one such risk became an issue which required subsequent resolution.

Section 14 Closure of the Collaboration

Formal Closure

As the last formal interaction between the contractor organization and the SEI, a closure session was conducted. Due to funding constraints, this occurred approximately four months before the completion of the project.

Continued Through Project Completion

With the disengagement of the SEI from the effort, team risk management was continued. Risk management processes were facilitated by the client members of the transition team, with risks being managed, updated, mitigated, and closed.

Closure Interview

The closure of the collaboration consisted of a formal interview by SEI personnel of the key project personnel, including the program manager, software manager, and senior system engineer on the project. A formal questionnaire was used and the responses were recorded.

Ground Rules

The ground rules of the interviews were that comments would not be attributed to anyone in the group but would be used in generalized form, as anecdotal evidence in reporting the results of the collaboration.

Lessons Learned: Team Aspect and Communication

The comments and lessons learned from the session are integrated into appropriate sections of this report. The interviews proved valuable as a final commentary on the entire transition effort, and provided detailed comments and a broad perspective on the collaboration. A key theme that emerged was a strong sense of teaming that the participants felt characterized the effort, resulting in a fundamental cultural change of better communication on the project.

Section 15 Continuation

Follow-on Project

As part of the collaboration, the SEI participated in the implementation of team risk management within another project. The contractor's transition team members led the effort, including the baseline activities. The SEI participated as part of the baseline team, but played an advisory role and supported the activities as session recorder.

Baseline

The baseline review was conducted by personnel on the contractor's transition team. One member of the technical staff from the SEI participated in the baseline review, not as a team leader, but rather as a working member of the team.

Change in the Baseline Process

One detailed process change was made in that copies of the SEI risk taxonomy [Carr 93] were distributed prior to the interviews. This proved to be disruptive to the interview process. Participants entered the interview sessions with a prepared list of risks. This seemed to subdue, at least at the outset, the nominally very interactive dialogue of the interview; individuals simply read their risks, rather than reacting to the specific interview questions.

Project Involvement

While explicitly *not recommended* by the interview guidelines, one of the interviewers for the baseline was also assigned to the project. This was necessitated due to resource constraints within the contractor organization. During the interview conducted by this individual, some of the participants were reticent and others were argumentative, especially in discussions of specific areas of the project that involved responsibilities that were shared by the interviewer.

Application for Other Projects

The success of the team risk management approach on the pilot project has provided the stimulus for the contractor to include risk management in other proposals and projects.

Chapter 5 Compendium of Comments

Selected Comments

This chapter presents a set of comments made by personnel from within the contractor organization. These are grouped by topic or key issue.

The comments presented below were provided by contractor personnel, both project and nonproject personnel, and indicate a gradual evolution of team risk management into a routine and valued component of the project.

Note: Brackets are used to identify editorial additions that were employed to improve the clarity of the quotes and comments.

Skepticism Gradually Replaced

One of the gratifying aspects of this effort was the fact that the skepticism, very evident at the outset, was gradually replaced with active involvement in the process.

- [There] was a fear we'd be chasing "ghosts," but TRM generated "real issues"; the process dealt with "ghosts" and let us focus on the top risks.
- There was some fear that it [TRM] might be an inhibitor, "inhibit" things.
- I was a fence-sitter when all this began, but through this process we were forced to develop risk management in a very open, democratic style.

Culture Change Comments by Project Personnel

The collaboration gradually resulted in a cultural change within the project.

- [There was a] daily change in focus, especially in those risks in ranks like 4 and 5 (lower than the top most).
- There was "a lot of value [in TRM] and [it] re-oriented our thinking."
- [There was a] Culture change: risks now in the forefront at weekly and monthly project meetings — you can deal with them now.

Costs

While the explicit cost savings was difficult to quantify in this effort, some of the observations presented below indicate the perception of value added and cost avoidance evidenced in the project.

- [Team risk management] helped with cost avoidance. Would have cost more if [we] had not been able to resolve things in a timely manner.
- An impression of the team risk management approach is reflected in the comment, "Focus is on cost-effective, minimum resource utilization."

Flexibility in the Transition

The flexibility in implementation details was important and helped the client to feel part of the process and a sense of ownership.

- The integrated-incremental introduction of process was effective in getting the methods and tools accepted.
- Initially, the process was viewed as an add-on. Need to be viewed as add-on initially; later [it was] more integrated, less add-on sense.

Support Tools

While tools for supporting team risk management were not a primary issue, it is noteworthy that tools were seen as valuable.

- Want more tools to support process: online as opposed to paper; cost to get started with databases, etc.
- Use of spreadsheet for data collection/reference helped.
- More "tools" [to support the process], more widely available. Also PC tools [to handle data].
- If we are going to practice this on an organizational level [need] tools/ computer tools [data management, etc., and a] manual needed.

General Observations

These comments provide a broad assessment of the value of the team risk management process.

- Improved communications between customer and supplier was most successful aspect.
- Teaming is what worked; team was outstanding. [It was] noncombative.
- [The approach] avoided "contractual nuances."
- Having a risk in the forefront might have influenced what you do, e.g., you might have done A-B-C but did C-B-A instead because of the identified risks.
- Started as a software process and quickly became system-oriented, which was the right thing to do.
- Getting [risk] in front of people on a regular basis makes people aware of it.
- [Risk management] stimulated more timely resolution rather than identification of problems.

Issues and Criticisms

A number of issues and criticisms help to identify aspects of the transition and collaboration that needed improvement.

- Early reluctance with team to put everything on the table.
- Mitigation of toughest risks was the hardest thing to accomplish.
- Still difficult to deal with long-term risks; more comfortable with the near-term, concrete things.
- [The difference between] risk and problem still isn't always clear, even to us.

Chapter 6 Observations and Lessons Learned

Description

This chapter is a compendium of observations made by the transition team and a summary of the lessons learned.

Observations

A number of important observations that were made by the transition team regarding the collaboration, transition, and team risk management are summarized below.

- Attaining and maintaining effective communications is the central issue in the government – contractor relationship.
- The collaboration has demonstrated that government and contractor perspectives can be openly shared.
- The trust between all partners in the process, including the SEI, and confidence in the team risk management approach itself must develop gradually over time.
- The approach successfully provided a forum for communication about what are often perceived as negative, unpleasant issues. This success demonstrated that groups can work effectively together, not only on these issues but on other, less sensitive issues and build and sustain cooperative relationships throughout the program.
- The adaptability of the methods was valuable and facilitated the integration and acceptance of the team risk management methods into the established processes of the organization.
- Incremental adoption of the processes and methods was effective.
- The stimulus of regular meetings proved invaluable in both facilitating the process and securing feedback.

Commitment

To successfully implement this technology, it is vital that the organization make the commitment in dollars and time, and assign a sufficient number of personnel with the responsibility and concomitant accountability to implement the technology and ensure its success.

Look at All the Risks

It is important to push to have the project look at *all* of the risks. There was a reluctance to deal with any more than the most important risks. Although a process was developed to ensure that the complete list was reviewed periodically for changes (e.g., increased probability or impact) and used as a stimulus for the identifying new risks, this process was not rigorously followed.

While this review effort should be conducted as a low level-of-effort task, it was evident that this review can identify new risks and enable early recognition of important risks that require management attention.

Rigorous Closure Process

Throughout the pilot effort, risks were closed, much as one would close an action item. In many cases, especially early in the process, risks were closed prematurely. It is important to adhere to a rigorous and structured closure process to help prevent premature closures of risks. For example, a method used in the team review required agreement of both program managers before closing a joint risk.

Adaptable Implementation

A basic approach used in the collaborative development involved the presentation of proposed methods and products, and their subsequent refinement and adaptation based on the client's needs and suggestions. This adaptable character of both the team risk management approach and the collaboration itself appeared to be a key factor in gaining acceptance of risk management concepts in general, and team risk management in particular; it was also helpful in developing confidence in the methods and trust across government, contractor, and SEI personnel.

Incremental Introduction

The incremental introduction of processes proved valuable by enabling project personnel first to master parts of the process, make modifications as needed, and then learn additional methods gradually. This facilitated the identification of improvements, the effective use of the methods, and the integration of the approach into the project.

Collaboration Was Important

Substantial value was derived from the involvement of the contractor's project and nonproject personnel. Their input in the form of changes to the process and methods, and suggestions for the redesign of tools (forms, spreadsheets, etc.) helped establish more of a sense of ownership. The processes were perceived as a mutual agreement, rather than viewed as imposed.

Need to Provide a Stimulus

One of the key lessons learned, which arose out of a behavior that was evident throughout this collaboration, is that a periodic stimulus is required to ensure that the processes are executed.

It was observed that while the contribution and value added of the team risk management processes were acknowledged early in the collaboration by project personnel, pressing problems and project demands often resulted in risk management being relegated to a lower priority activity. This was especially evident during the first few months of the collaboration.

For example, as circumstances changed or new issues emerged, these were not explicitly documented, and occasionally risk discussions were terminated prematurely or not held at all due to "more pressing problems." Implicit actions and awareness seemed to be a more expeditious way to deal with these risks.

Coordination Meetings

The transition team found that the regular coordination meetings held with the project proved to be an effective stimulus for the project. These meetings precipitated action and prompted the project to deal explicitly with risks on an ongoing basis.

Coordination Meetings Became Routine

In the later stages of the collaboration, the coordination meetings became increasingly perfunctory and acted as a focused event in time that was used to convey results of the risk management efforts. The project was fully prepared and the presentations were concise. Issues were clearly delineated and the time required to review the risks diminished substantially.

Similarly, the transition team coordination meetings become increasingly routine, dealing less with the specifics of the project and addressing more global, follow-on issues.

Evolved to Become Routine and Integral to the Project

As the collaboration progressed, the practice of team risk management became a routine and integral part of the program's management processes. The discussions of risks were incorporated into regular project meetings, and risk management was seen as a vital part of the project management's responsibilities.

Near-Term Orientation

It was easy for the project to delay explicit action on the longer term (future) issues, like risk, in order to handle the immediate crises. This may be due to the pressure to see results and the lack of immediacy that characterizes risk. While this may also be symptomatic of resistance to change, a concerted effort must be undertaken to encourage the project team to continue to be vigilant and look ahead.

This issue continues to be one of the more difficult aspects of implementing effective risk management.

Chapter 7 Summary

Key Aspects

The collaboration was successful in transitioning team risk management into a pilot project and fostering its adoption in other projects within the larger contractor organization.

The aspects of this effort that received positive feedback and provided a basis for success can be summarized as follows:

- Maintain a flexible approach.
- Encourage teamwork.
- Utilize an incremental introduction.
- Integrate into other program management processes.
- Provide a periodic stimulus.
- Foster a champion.

Flexible

It is important to incorporate flexibility in the approach in order to enable modifications to improve process effectiveness and meet the unique requirements of an organization.

Collaborative Involvement

The contributions of contractor personnel both within and outside of the project proved invaluable in defining effective enhancements to the processes, methods, and tools of team risk management. As the collaboration evolved, a sense of teamwork pervaded all aspects of the effort.

Incremental Introduction

An incremental approach provided the format for gradual introduction of additional and more complex activities, and enabled modifications of processes as they evolved.

Integrate into Processes

The concerted effort to establish risk management activities as a normal part of the project and integrate these into established project management activities fostered acceptance. As a result, risk management was viewed as an integral part of, rather than an add-on to, routine project activities.

For example, regular project meetings became the forum for conducting reviews of risks and consolidating risk management activities.

Stimulus Is Required

A stimulus is required to provide encouragement, to act as a prompt to action, and to reinforce the successes. The regularly scheduled coordination meetings proved to be a prompt for action on risks. As the collaboration matured, though, the need for the stimulus diminished and risk management became self sustaining.

Champions Are Important

As has been demonstrated here and in other studies, a champion(s) at all levels of the project is vitally important to help ensure success. For this effort there were champions of the approach within technical and multiple management levels of both the government and contractor organizations.

Open Communication Can Be Achieved

While the installation of team risk management practices and establishment of trust between all parties was a gradual process, this collaboration has shown that government and contractor perspectives on risks can be openly shared. These successes and the key aspects of the collaboration that are summarized here embody a central issue in successful transition: attaining and maintaining effective communications among all parties involved. Team risk management and the collaborative approach described here provide a forum for effective communication and a basis for cooperation for successful risk management.

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This report presents results of a collaborative development effort to transition the Software Engineering Institute (SEI) team risk management process into practice. The collaboration involved a DoD program office (customer), a commercial contractor (supplier), and the SEI in an effort that included development, test, and refinement of the team risk management approach. The focus of the report is on the results of the collaboration between the contractor organization and the SEI.

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